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FOOD AND AGRICULTURE ORGANIZATION JO #50 FINAL REPORT

Report for RAMP-CLIN 0002-JO# 5O-FAO

RAMP/FAO
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1. Job Order Number:

JO#50-G-05-FAO

2. Implementing Agency and Contact:

* Name:

Food and Agriculture Organization of the United Nations

Mr Serge Verniau

FAO Representative, Afghanistan

Tel: (+93) (0)70288154

Email: serge.verniau@af.fao.org

3. Contract Line Item Number

(CLIN) RAMP-CLIN 0004

4. Reporting Period

1st March 2005 to 30th June 2006

5. Total Project Budget

US$1,969,119

In addition, the FAO emergency pest control programme received support from other donors during the reporting period as follows:

- Government of Norway
- Government of Switzerland
- UNAMA (United Nations Assistance Mission in Afghanistan)

6. Summary of Project Activities and Impact

6.1. Locust control

6.1.2. Methods of Control

The project carried out emergency control of Moroccan locust (*Dociostaurus maroccanus*) in the provinces of Kunduz, Baghlan, Samangan and Balkh during 2005 and 2006. This was the continuation of a programme of locust control that had begun in 2002 and has had substantial support from USAID. OFDA was one of several donors to the 2002 campaign, while RAMP was the major donor in 2004. Pesticide was procured with funds from other donors.

The campaign was organised in close cooperation with the provincial and district authorities, the farming communities and the Ministry of Agriculture, Animal

Husbandry and Food (MAAHF). While the project provided technical supervision, equipment, pesticide and transport, the beneficiary communities were asked to provide teams of spray operators. Technical staff from Plant Protection and Quarantine Dept. (PPQD) was seconded from Kabul to participate in the campaigns.

Control was carried out using the Ultra-Low Volume (ULV) spraying technique with two insecticides: diflubenzuron and deltamethrin. ULV spraying is intrinsically more efficient than high volume spraying, as less of the chemical runs off onto the ground. In remote areas, especially if they are arid, it is logistically preferable as it does not require the transportation of large quantities of water, uncommon in such areas.

Diflubenzuron belongs to a group of insecticides known as Insect Growth Regulators (IGRs), so called because they inhibit the synthesis of chitin and cause larvae or nymphs to die at moulting. IGRs are stomach poisons and are sprayed onto the vegetation, which is ingested by the insects. Diflubenzuron can persist for several weeks on the vegetation, allowing it to be sprayed in barriers, thus reducing the overall application rate, and avoiding the need for respraying if more hoppers subsequently appear. However, it is slow acting, taking up to 10 days before the insects die, and is not effective against adults, which do no more moult. It is therefore necessary to have a fast-acting insecticide effective against adults (and sometimes against hoppers when the groups or bands directly threat the crops). Deltamethrin, a pyrethroid, was selected for its proven efficacy against locusts and its low vertebrate toxicity.

Two types of sprayer were used. The ULVAMAST is mounted on the back of a pickup truck and powered through the electrical system of the vehicle. Under ideal conditions, it can treat up to 600 hectares per hour, although the limitations of the terrain reduce this in practice. The ULVA is a hand-held sprayer, driven by six torch batteries. It has a workrate of up to 5 hectares per hour. It is necessary to have teams with hand-held sprayers to treat areas that are inaccessible to vehicles.

In each province, a Coordinator was appointed to be responsible for dealings with the authorities and local communities. In addition, one or two Supervisors were appointed. These were qualified Plant Protection technicians and they were responsible for the day to day supervision of the campaign. Each team of ten spray operators was recruited and led by an Organizer, who was employed and trained by the project. The spray operators themselves were supported by the beneficiary communities. Each team had a hired vehicle and camping equipment. All personnel had protective clothing for spraying, consisting of hats, overalls, masks, rubber gloves and rubber boots.

6.1.2 Implementation of Control

The control campaigns for 2005 and 2006 are summarized in Table 1.

Table 1a: Locust control 2005, Area (ha) by Province and Month

Province	Total	Mar	Apr	May	Jun
Baghlan	**27,704**	3,338	19,568	4,798	0
Balkh	**56,327**	8,261	32,794	15,072	200
Kunduz	**28,680**	5,059	19,968	3,015	638
Samangan	**31,091**	1,480	22,927	6,684	0
Total	**143,802**	**18,138**	**95,257**	**29,569**	**838**

Table 1b: Locust control 2006, Area (ha) by Province and Month

Province	Total	Mar	Apr	May	June
FAO	60,691	9,004	35,914	15,773	0
PPQD Baghlan	1,223	0	1,103	120	0
PPQD Balkh	19,002	2,991	11,372	4,639	0
PPQD Kunduz	34,656	2,881	24,556	7,207	12
PPQD Samangan	4,517	0	2,610	1,842	65
Total	**120,089**	**14,876**	**75,555**	**29,581**	**77**

6.1.3. Oviposition survey

At the end of each campaign, a survey of egg-laying (oviposition) was carried out. This contributed to provide a forecast of the size and distribution of the locust population for the following year. The results of the surveys from 2002 to 2006 are shown in Table 3 and Figures 1-5.

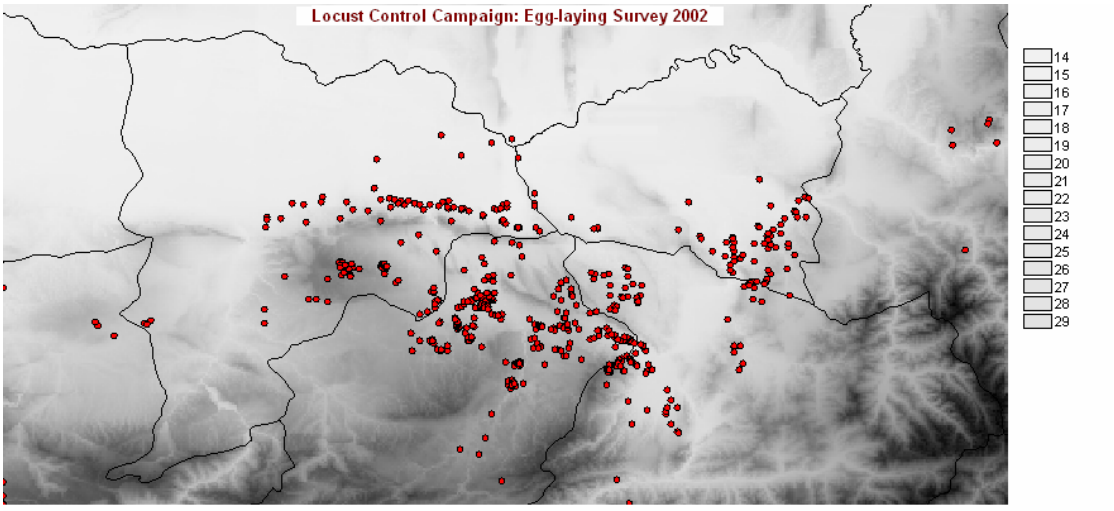

Fig. 1: Oviposition survey 2002

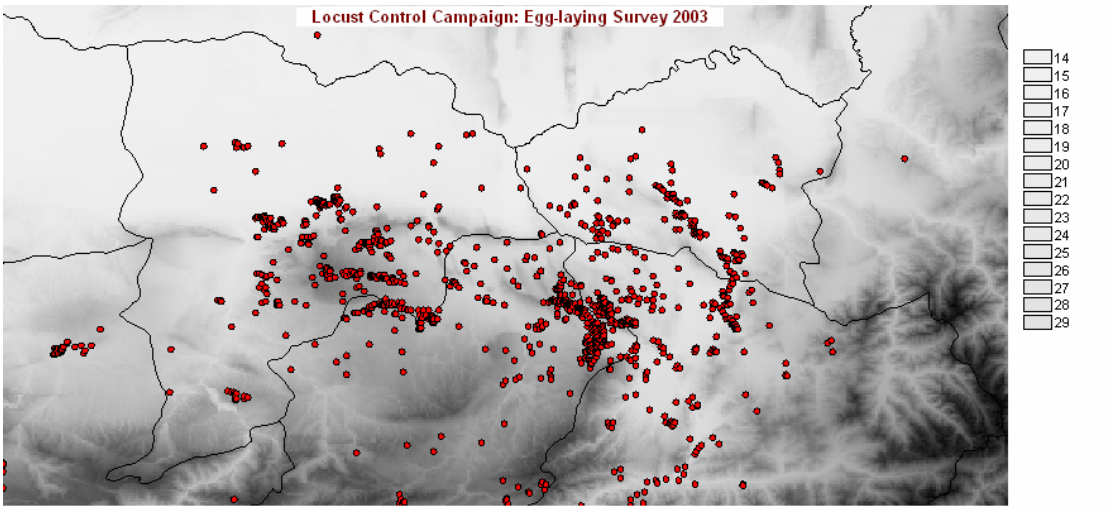

Fig. 2: Oviposition survey 2003

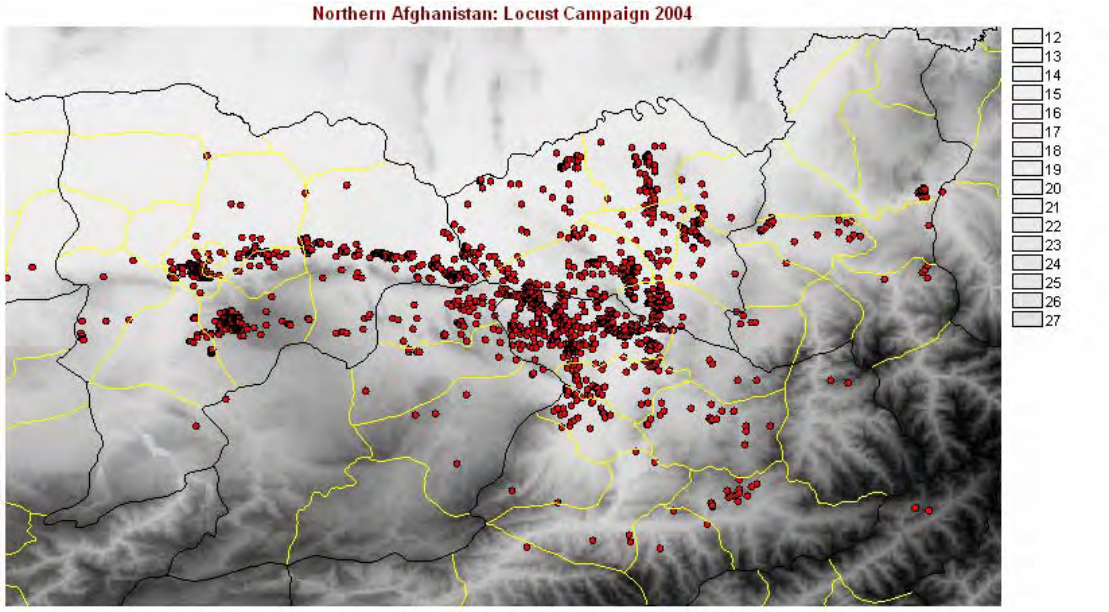

Fig. 3. Oviposition survey 2004

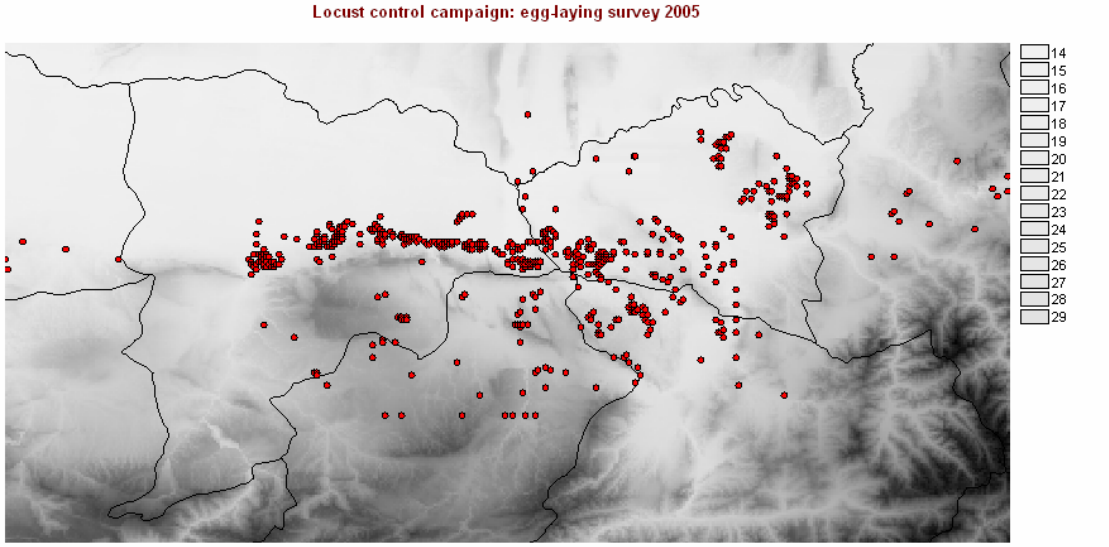

Fig. 4. Oviposition survey 2005

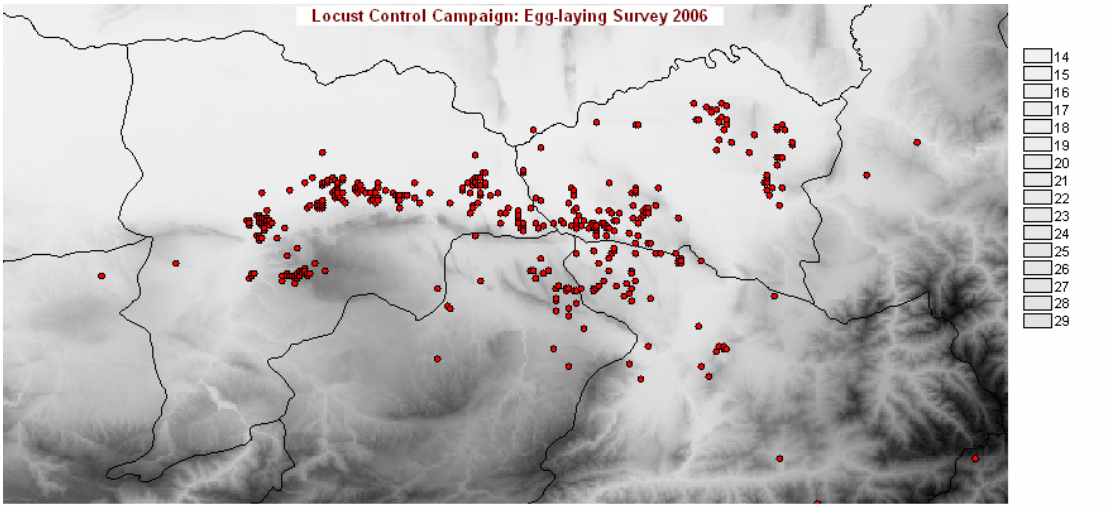

Fig. 5. Oviposition survey 2006

6.1.4 Reporting and Database System

In 2002, the project developed a system of reporting and data management using a database developed in Microsoft ACCESS. It currently contains over 10 500 control reports and over 8 800 egg-bed reports and produces summary output as tables or files that can be imported into the IDRISI GIS program and displayed as maps. Based on the lessons learned from this system, the project commissioned a professionally programmed database using Microsoft INFOPATH and SQLServer. Among its advantages are:

- greater flexibility in the types of report that can be entered,
- data entry by multiple users,
- better data validation procedures,
- a multilingual interface, including Dari and English,
- output in industry standard GIS formats,

(see Annex # for a detailed specification). The data in the existing system will be transferred to the new, thus providing a valuable archive for future planning or research.

6.1.5 Impact of Campaign

The impact of the programme can be assessed by three criteria:

- protection of crops in the year of each campaign,
- elimination of locust population, thus reducing the level of control required in future,
- building the capacity of PPQD and local communities to carry out surveillance and preventive control in future.

Assessing the quantity and value of crops protected by locust control is notoriously difficult and, arguably, even impossible. In some areas, rainfed wheat is sufficiently close to the egg-beds for the wingless hoppers to march into the fields, but generally locusts breed away from cultivated areas and the adults migrate into them as the natural pasture dries out. They can easily fly 30-50 km. If a hectare of egg-bed can develop into half a square kilometre of flying swarm, capable of eating its own weight in fresh vegetation every day, it can plausibly be argued that a plague of locusts, allowed to multiply unchecked over several years, would have made agriculture in northern Afghanistan all but impossible.

However, an attempt was made to estimate the crops saved, applying a GIS analysis relating the distribution of rainfed and irrigated cultivation to the location of control activities. The methodology is described in detail in the Impact Statement, and the results are summarized in Table 2.

Table 2: Estimate of Crops saved: 2005 (Hectares and Metric Tonnes)

Province	Ha Rainfed saved	Ha Irrigated saved	MT Rainfed saved	MT Irrigated saved	MT total saved
Balkh	19,676	14,833	20,660	37,082	**57,742**
Kunduz	2,835	44,427	3,968	111,067	**115,036**

Samangan	11,802	2,493	12,392	6,531	**18,923**
Baghlan	5,664	14,092	8,496	35,230	**43,726**
Total	**39,977**	**75,844**			**235,427**

The impact of the programme on the locust population can be gauged from Table 3, which shows the area of egg-beds detected and measured in the annual oviposition survey, carried out at the end of each campaign and from Figures 1-5. The increase from 2002 to 2003 reflects improvements in access to breeding areas and in survey technique. The table probably understates the decline in population, since with each season, there has been access to previously unsurveyed areas.

Table 3: Oviposition Surveys of Moroccan locust in Northern Afghanistan (hectares of egg-beds)

Province\Year	**2002**	**2003**	**2004**	**2005**	**2006**
Baghlan	18,915	70,573	46,706	2,909	730
Balkh	12,900	24,946	37,046	29,647	5,403
Kunduz	9,187	94,084	19,745	3,458	408
Samangan	116,133	124,539	23,413	1,911	6,800
Sar-i-Pol	1,742	8	nd	nd	nd
Takhar	1,107	0	268	nd	nd
Total	**159,984**	**314,150**	**127,178**	**37,925**	**13,341**

The programme has seen a steady increase in the experience and competence of the PPQD technical staff. In 2005, eight technical staff were seconded to the locust campaign and in 2006, this was increased to eleven, of whom one was responsible for data entry. They now:

- are experienced with the technology of locust control, using ULV equipment,
- have become familiar with the terrain of the main locust breeding areas,
- are familiar with the reporting and database system,
- have established links with the beneficiary communities who themselves participate in the campaign.

There are now well over 100 MAAHF personnel at the provincial level who are trained and experienced in organizing and leading teams and over 1,000 local people who have worked as spray operators. As a result, local communities have a good understanding of the locust control strategy and, given the resources, are able to participate effectively in further preventive surveillance and control (see Beneficiary Statements).

6.2. Sunn pest control

6.2.1. Methods of Control

The project carried out extension programmes to enable farmers to control Sunn pest in 2005 and 2006. The Sunn pest species in northern Afghanistan is *Dolycoris penicillatus*, a large, sap-sucking bug that migrates between the mountains of the Band-i-Turkestan, where it hibernates as an adult, and the desert lowlands of Turkmenistan, where it breeds in the Spring. During its return migration in the late Spring (May), it attacks wheat at the milky stage, causing severe losses in yield and quality, as the enzymes injected into the grain break down gluten. Sunn pest are well

known in Herat, Badghis, Faryab, Sar-i-Pol and Juzjan provinces. They have recently appeared in Balkh and Samangan.

Following severe losses from Sunn pest, particularly in Faryab province, FAO proposed an emergency project for 2005, consisting of the following elements:

- an extension exercise to teach farmers to recognise sunn pest and to control them using sweep nets;
- a survey of breeding areas in the spring;
- distribution of nets to villages;
- a limited campaign of chemical control in areas where mechanical control was insufficient or not practical; and
- a winter survey of hibernation sites.

During the 1990s, the FAO Plant Protection programme in northern Afghanistan developed a method of mechanical control, using sweep nets. The reasons for promoting mechanical control are:

- it presents no safety or environmental hazard;
- the training requirements are minimal;
- nets are cheap;
- nets can be reused, for years if necessary;
- nets are easy to distribute and need no supervision.
- it is hoped that they will be adopted and manufactured locally in the longterm.

Nonetheless, it was realised that mechanical control would be impractical for some farmers and that chemical control would be necessary for them. However, if those farmers who needed pesticide relied on the supply available through the private sector in the bazaar, they would only be able to obtain dangerous products banned elsewhere or ones of low quality.

In 2005, therefore, FAO, using funds from another donor, procured 20 000 litres of deltamethrin ULV (see above) for distribution to the most heavily infested areas.

6.1.2 Sunn pest Control in 2005

6.1.2.1 Recruitment and training of Community Organisers

Courses for training community organisers were held in Shiberghan and Maimena. The Shiberghan (Juzjan) course included project staff from Sar-i-Pol and was also attended by staff of the Central Asian Development Group (CADG) from Helmand (see Table 4).

Table 4: Sunn pest Community Organisers by Province, 2005

Province	number
Sar-i-Pol	14
Juzjan	14
Herat	13
Faryab	18
Balkh	0
Samangan	0

Badghis	0
Total	**59**

6.1.2.2. Farmer training by surveyor/extension workers in areas at risk

Surveyor/extensionists visited villages in their areas and established contact with community leaders. They carried out training in mechanical control using sweep nets and also gave instruction in the safe and effective use of ULV spraying.

6.1.2.3. Survey of breeding areas

The surveyor/extensionists carried out a survey of the known breeding areas for Sunn pest and the provisional results are shown in Figure 6. Breeding was observed mainly below 1000m altitude, but there is evidence from the presence of nymphs found during the control campaign, that there was breeding above this level.

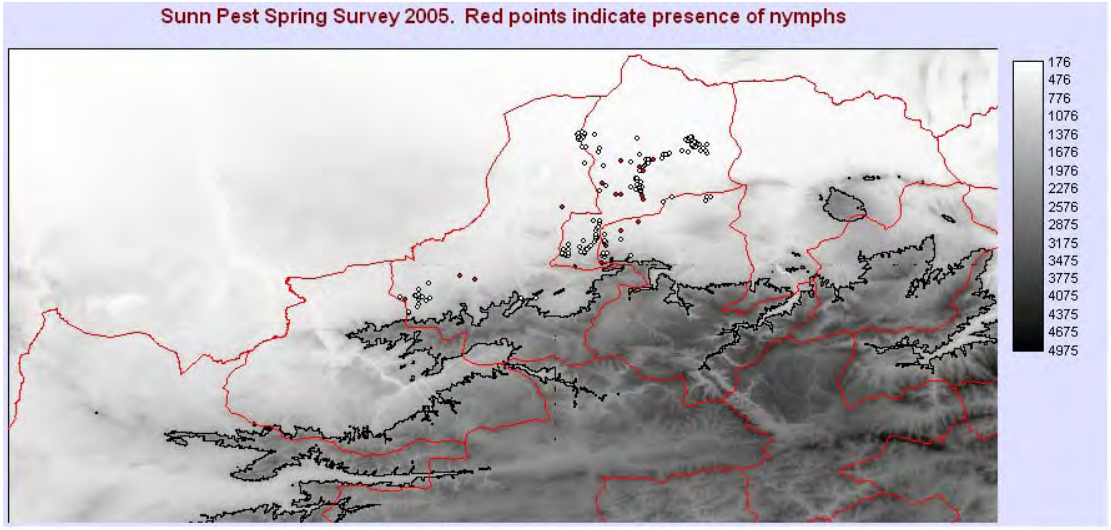

Figure 6. Sunn pest Spring survey 2005. Points in red indicate nymphs recorded. The 2000 m contour is shown in black.

6.1.2.4. Distribution of control materials to areas at risk

Table 5 gives the distribution of inputs to the provinces.

Table 5: FAO inputs sent to provinces in 2005

Province	Total	Juzjan	Sar-i-Pol	Faryab	Herat	Balkh
ULVAs	**1 560**	60	200	1 000	300	0
Protective clothing	**1 560**	60	200	1 000	3 000	0
Batteries	**7 272**	360	864	6 048		0
Deltamethrin (litres)	**18 540**	3 000	3 800	7 500	4 240	0
Nets	**34 675**	6 000	5 000	13 000	10 000	675

6.1.2.5 Monitoring and supervision of control operations

Once the sunn pest migration had started, on 20 May, the community organisers visited the villages in their areas to distribute nets where there were infestations and to organise chemical control where this was necessary. They were also instructed to sample the density of sunn pest by counting the number caught in ten sweeps of the net (see Table 6).

Table 6: Mean numbers of sunn pest caught in ten net sweeps, by district

District	No. of samples	mean density
Chemtal	41	49
Almar	43	191
Belcharagh	42	186
Dowlatabad	30	204
Gorziwan	55	138
Gosfandy	126	12
Khoja Musa	16	131
Kohistanat	36	141
Maimena	18	107
Pushtoon Kot	87	135
Qaysar	116	172
Shirin Tagab	24	131
Gulran	73	66
Kushk-i-Robat Sangi	109	93
Kushk-i-Kohna	50	229
Obey	6	204
Andkhoy	16	26
Aqcha	27	17
Darzab	80	226
Faizabad	23	131
Khanaqa	18	27
Khancharbagh	17	26
Khoja do koh	23	60
Qaramqol	12	28
Qosh Tepa	72	190
Qurghan	13	33
Shibergan	48	85
Gawi	30	17
Sangcharak	102	41
Sayad	210	299
Sayadabad	29	44
Sar-i-Pol	108	107
Suzma Qala	66	466*
Kohistanat	132	312

* Due to the high value there is concern that there was a calculation error when in the field.

6.1.2.6 Winter Survey of Sunn Pest Hibernation Sites

In 2002, FAO carried out a survey of sunn pest overwintering sites. At the time, the population was relatively low. However, unfortunately, these surveys were not continued in 2003 and 2004 and so the build up and spread of the population was not monitored. During 2005, it was decided to expand the survey and, rather than monitor a limited number of known sites, try to establish the overall extent of the overwintering population and define its distribution using GPS. It is especially valuable to do this during a population peak. The survey lasted one month and the results entered onto a spreadsheet for analysis and are displayed in Fig. 7. The 2000 metre contour is shown in black.

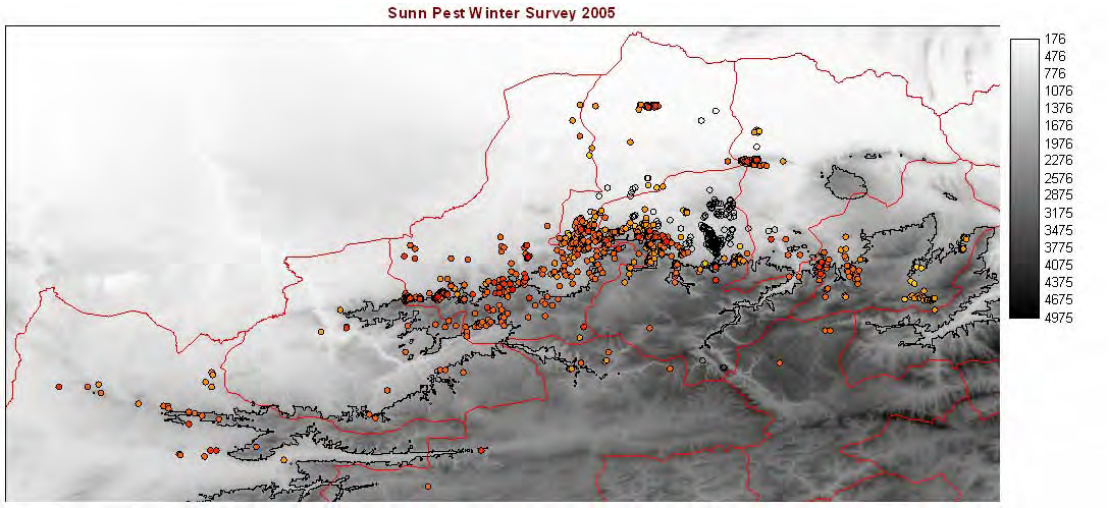

Fig. 7: Winter Survey (empty circles indicate no Sunn pest found)

6.1.3. Sunn pest Control in 2006

6.1.3.1

It was apparent at the end of the 2005 season that a larger scale effort was needed if it was to make a serious impact on the scale of the problem. If was also decided that Badghis, which had previously been excluded from the project on security grounds, should be included. The number of organisers was therefore increased to 163 and a more structured approach to community involvement was adopted.

Community organisers were instructed to visit mosques and community councils (*shuras*) and establish links with groups of farmers who wished to participate in the project by receiving training and nets.

It was also decided that there should be no distribution of free pesticide by the project. Although the distribution of free pesticide was considered necessary in 2005, there were objections to it:

- it is unsustainable;
- it is impossible to allocate a free input in an economically optimum way;
- it created a disincentive to adopting mechanical control, which was the preferred option.

FAO therefore discussed with RAMP the possibility of International Fertiliser Development Corporation (IFDC), then implementing a project to develop the private sector supply of agro-chemicals, being able organise the commercial import, distribution and sale of an appropriate insecticide through a network of trained dealers. In the event, IFDC was not in a position to do this, but RAMP was able to arrange that a private company, Noor Bros. imported 50 000 litres of deltamethrin, in ULV and EC (emulsifiable concentrate, suitable for use in knapsack sprayers) formulations. This allowed farmers to make their own economic choice as to whether to use chemical or mechanical control and removed the allocation and distribution of pesticide from the hands of PPQD and project staff.

6.1.3.2 Recruitment and training of field staff

The project recruited 163 Community Organisers (see Table 7). Training courses were carried out in Shiberghan (Juzjan), Sar-i-Pol, Maimena (Faryab) and Herat. The project also recruited Provincial Coordinators and Supervisors in the target provinces. Each Community Organiser was equipped with a motor-cycle.

Table 7: Sunn pest Community Organisers by Province, 2006

Province	number
Sar-i-Pol	28
Juzjan	32
Herat	19
Faryab	43
Balkh	12
Samangan	10
Badghis	19
Total	**163**

6.1.3.3. Spring survey of breeding area

As in 2005, a Spring survey of the breeding areas was carried out in Samangan, Balkh, Juzjan, Faryab and Sar-i-Pol. The results are given in Table 8. As in 2005, the density of the Sunn pest was estimated by the number caught in 10 sweeps of the standard net.

Table 8: Results of Spring Survey by district

DISTRICT	sites	SP/10 swps
Marmol	1	nd
Balkh	67	64
Chahar-Bolak	75	48
Chahar-Kent	62	54
Chahi	5	200
Chahi Dawlat-Abad	1	90
Chemtal	79	59
Dawlat-Abad	8	179
Dehdadee	20	20

Kholm	24	67
Kishindeh	40	99
Marmol	56	35
Nahr-e-Shahi	41	47
Sholgara	45	33
Zaare	48	39
Balkh		**74**
Almar	4	nd
And-Khoy	54	23
Belcheragh	62	nd
Dawlat-Abad	4	nd
Gurzewan	12	nd
Khan-Chahar-Bagh	24	19
Khowja-Sabzpush	16	nd
Kohestanat	4	nd
Pashton-Kot	227	nd
Qaramqol	33	31
Qarghan	58	18
Qaysar	85	nd
Shirin-Takab	4	nd
Takab-Shirin	4	nd
Faryab		**23**
Aqcha	38	12
Darz Ab	118	153
Faiz-Abad	68	36
Khanoqa	47	6
Khowja Dukoh	32	7
Qosh Tapa	125	8
Shibirghan	72	15
Jowzjan		**34**
Dar-e-Suf	80	nd
Roy-e-Do Ab	118	nd
Samangan		
Gosfandi	82	16
Kohestanat	110	10
Sayedabad	40	14
Sancharak	68	32
Sayad	160	15
Sozma-Qala	106	31
Sar-i-Pul	142	24
Sar-i-Pul		**20**
Grand		**47**

6.1.3.3. Community visits and farmer trainig

The Community Organisers visited villages and established links with farmers groups through mosques and community councils (*shuras*). Fig. 8 shows the locations of

those communtities for which GPS coordinates were obtained. Table # gives the number of communities visited in each district and the number for which coordinates were taken. Because of a shortage of GPS handsets, not all communities had their locations registered.

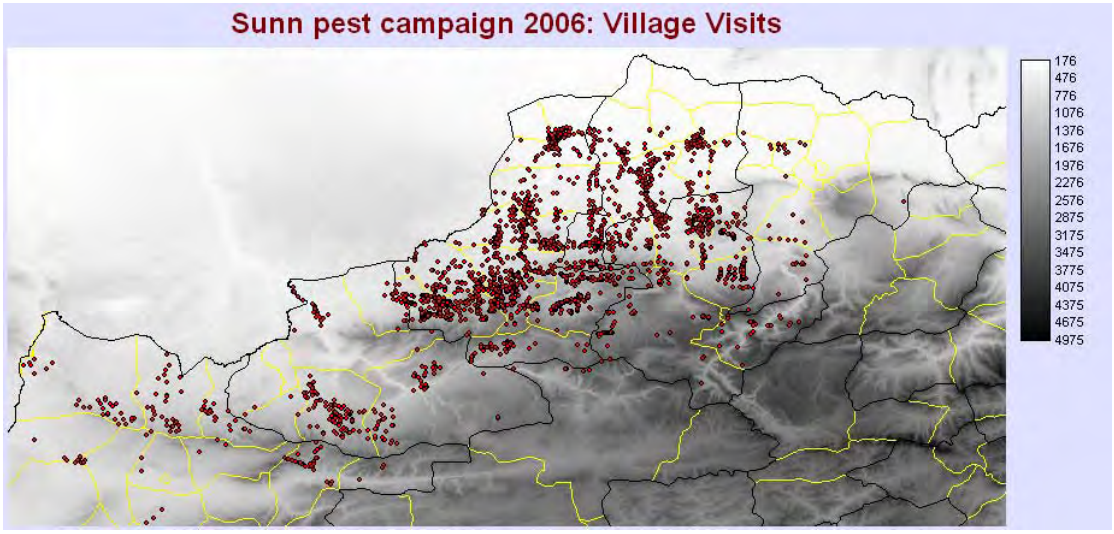

Fig. 8: Village visits by Sunn pest Community Organisers, 2006

Table 9: The number of communities visited in each province (see map Fig. 8)

Province	Comm-unities	Average Irr. Ha	Average. RF ha	SP in 2005	Mech Con 2005	Chem Con 2005	farmers with nets	farmers wanting nets
Badghis	627	48	458	626	47	180	629	28,240
Balkh	599	138	336	389	117	34	173	17,998
Fareyab	1,710	42	153	1,698	971	1,166	8,524	73,770
Herat	256	205	318	215	169	175	2,818	7,423
Jozjan	433	188	170	420	310	261	2,368	37,441
Suri-Pul	635	32	263	540	406	387	4,528	28,664
Total	**4,260**			**3,888**	**2,020**	**2,203**	**19,040**	**193,536**

6.1.3.4. Distribution of inputs

The programme procured 50 000 nets, with 8 780 extra bags, for mechanical control (see Table 10).

Table 10: Procurement of Nets

project	date	item	qty	price	cost
other donor	27/04/2006	bags	21000	$1.00	$21,000.00
other donor	27/04/2006	frames	20000	$1.29	$25,800.00
other donor	02/05/2006	bags	16000	$1.00	$16,000.00
other donor	02/05/2006	frames	12000	$1.29	$15,480.00
this project	06/05/2006	bags	15000	$1.00	$15,000.00
this project	06/05/2006	frames	15000	$1.29	$19,350.00
this project	09/05/2006	bags	6780	$1.00	$6,780.00
this project	09/05/2006	frames	3000	$1.29	$3,870.00
Total					**$123,280.00**

These, together with nets procured in 2004 and 2005, were distributed to the provinces as shown in Table 11.

Table 11: Distribution of nets and ULV sprayers for control of Sunn pest

Province	ULVs	Nets
Balkh	53	3,900
Samangan	50	2,200
Juzjan	140	15,000
Sar-i-Pol	200	15,000
Faryab	500	41,000
Badghis	300	9,000
Herat	200	15,000
Total	**1,443**	**101,110**

6.1.3.5 Impact

Severe drought in 2006 caused widespread failure of the rainfed wheat crop, making Sunn pest control a low priority to farmers in the affected areas. There was also a surprising drop in the level of infestation. The most plausible reason for this is that the desert vegetation in the breeding area dried out before the Sunn pest became adult. Unable to feed and unable to fly, they would have perished. However, it may also be significant that there were several days of exceptionally cold weather around 9th April and many farmers reported that Sunn pest, which had been present until then, disappeared.

7. Tasks Completed During the Reporting Period

7.1 Component 1: Locust control

7.1.1 Performed in 2005

- Selection of target areas in the Northern provinces, including Baghlan, Balkh, Kunduz, Samangan.
- Discussion with provincial authorities regarding the campaign. As for the previous locust campaigns, the role of the provincial authorities has been to mobilize communities to take an active part in the campaigns, promote media coverage, provide security and contribute to project implementation.
- Selection and training of supervisors and organizers for locust control campaign through consultation with heads of provincial agriculture departments, who coordinated the campaign at provincial level. Organizers were selected from the staff of the provincial agriculture departments and hired by FAO.
- Training of supervisors/organizers/PPQD technical staff by FAO. Training included locust bio-ecology, use of ULV hand-held and vehicle-mounted sprayers, pesticide application.
- Selection of technical staff from the PPQD or the MAAHF nominated by the head of the PPQD in Kabul. They received theoretical and practical training and will be able to work independently in locust control in the future.
- Identification of provincial project stores, recruitment of storemen and guards.
- Implementation of the 2005 locust control campaign involving:
    - Hiring of vehicles to provide transport for local control teams and provincial Supervisors.
    - Mobilisation of control teams. The organisers recruited, trained and supervised operators, who were nominated through targeted communities. Operators worked in teams under the direction of organizers.
    - Distribution of supplies to organisers, including ULV sprayers, batteries, accessory equipment, protective clothing, GPS and camping equipment. Pesticides, provided with funding from other projects, were issued from provincial stores through the campaign as required.
- Survey of oviposition by monitoring of adult swarms and identification of the egg-laying sites through existing operational groups (farmers, agricultural staff, FAO) to assess needs of campaign in 2006.
- Training of PPQD staff in laboratory technique.

7.1.2 Implementation of 2006 locust control campaign.

- Selection of target areas for FAO and PPQD locust control campaigns.
- Selection and secondment of five PPQD staff from Kabul to FAO locust campaign.
- Provision of support for the locust control operations to be implemented by PPQD in areas covered by campaigns in previous years:
  - handover of four vehicles with mounted ULV sprayers,
  - handover of hand-held ULV sprayers and protective clothing,
  - provision of pesticide procured with assistance from other donors,
  - financial support for field allowances for MAAHF staff participating in the campaign,
  - financial support for operating costs of campaign.
- Implementation of locust control operations in remote pasture and desert areas not covered by campaigns in previous years:
  - recruitment of ten locust control organisers and 70 locust control operators, paid by the project where there was no local community to support them, and 30 from communities which volunteered them,
  - deployment of five vehicle-mounted ULV sprayers,
  - secondment of five PPQD staff to the FAO campaign.
- FAO and PPQD carried out a survey of egg-laying by adults at the end of the season to evaluate the success of the campaign and assess the need for further control in 2007.
- Development of a Locust Database with Dari interface.
- All reports of survey and control operations were entered onto the Locust Database by PPQD staff and summary output are available as required.
- New Dari version of database developed.

7.2 Component 2: Sunn pest control

7.2.1 Performed in 2005

- Recruitment and training of provincial supervisors and 60 surveyor/extension workers.
- Farmer training by surveyor/extension workers in areas at risk.
- Survey of breeding areas and estimate of timing and extent of infestation.
- Distributed 34 675 nets and 17 400 litres of pesticide to areas at risk.
- Monitoring and supervision of control operations.
- Survey of overwintering sites.

7.2.2. Performed in 2006

- Recruited and trained 163 community Sunn pest control organisers.
- Extended the project area to include Badghis.
- Procured 18 000 nets for mechanical control.
- Carried out Spring survey of breeding areas to estimate timing and extent of infestation.
- Established network for farmer training through mosques and Community Development Councils.
- Trained farmers in mechanical and chemical control.
- Distributed 100 000 nets to farmers (including those previously procured and procured with funds from other donors).
- Distributed on loan 1 340 ULV sprayers for Sunn pest control by farmers.

8. Lessons Learned and Recommendations for Future Activities

Preventive locust control requires an aggressive, proactive and continuous programme of surveillance in the desert breeding areas identified by the project.

Locust control requires active community participation.

The most effective method of locust control is the ULV application of diflubenzuron to hoppers at as early a stage after hatching as possible.

PPQD should take complete responsibility for locust control, but must ensure that its campaign in 2007 is adequately funded and there is sufficient pesticide procured in good time.

Sunn pest must be primarily the responsibility of the individual farmer, assisted with advice by the extension service. The use of mechanical control should be encouraged, but suitable chemicals should be available on commercial terms through the private sector.

In this, as in other respects, the private sector supply of agricultural inputs should be actively encouraged.

There is a range of pests, diseases and weeds reducing yields and hence farm incomes. A broad based plant protection programme, based on the principles of IPM, is necessary for agricultural development to proceed.

9. Summary of Project's Relationship and Coordination with the Islamic Republic of Afghanistan and Appropriate Ministries during the Course of this Project.

This project has worked closely with the Ministry of Agriculture, Animal Husbandry and Food (MAAHF), and especially with the Plant Protection and Quarantine Department (PPQD), from the beginning. Ministry staff at national and provincial level have participated in the field activities of the project. Provincial Heads of Agriculture in the project area have acted as coordinators and Provincial Heads of Plant Protection as supervisors. Staff from PPQD HQ in Kabul have been seconded to participate in field operations.

Capacity building of PPQD has been central to the programme's activities from the beginning. This project has provided training for PPQD staff:

- training courses in laboratory technique, computer skills and English language;
- on-the-job training in locust control and survey techniques.

Project staff have met regularly with the Ministers and Deputy-Ministers, who have taken a close interest in the project's activities.

ANNEX 1
Locust Survey Database: Functional Specification

Overview
The system provides a data repository and data collection mechanism that aids the tracking of field observations of locusts. The deliverables of this software development project include:

1) A means for easily creating and modifying the field input report forms.
2) A database that is reliable and maintainable, compatible with industry standards and that uses standard, off-the-shelf tools for administration.
3) A means for exporting data to Excel, standard GIS packages, and other XML-compliant applications.

System Components
The primary components are:

1) A database that holds observations. The database resides on a single machine and uses the MSDE version of SQL Server. In this way the database can be easily maintained and no proprietary hardware requirements are introduced.
2) An auxiliary database (actually, physically part of the observation database, just logically different) that holds data on:
    - Place names such as villages in English, Dari and Armenian that could be expanded to any number of languages.
    - Form headings, labels and drop down list choices, also in multiple languages.
3) A set of electronic report forms for input that can be distributed to field personnel and that assist them in recording observations.
4) A input and output report form editor based on InfoPath 2003 SP1.
5) An export mechanism based on industry standards such as MS Office and ESRI. SQL Server can export data in XML format that can be read by many software applications including those two.
6) An editor that allows the multi-language editing for the auxiliary database described in 2).

Database
The database consists of a set of normalized tables that hold the data items listed in the data definitions document. The following functionality is provided by the database engine

1) Security – Login and passwords can be required of users. The database tables are stored in such a way that they cannot be read by unauthorized personnel.
2) Reliability – The data is protected from corruption by the backup and restore capabilities as well as by the transaction support built-in to SQL Server.
3) Compatibility – The data can be exported to other software packages using standard tools.
4) Integrity – The database is designed based on industry-standard normalization principles that eliminate redundant data storage and ensure that coordination between related data items is maintained.

Multi-language Capability

The system must be able to handle an arbitrary number of languages for the display of form elements.

There are three (3) kinds of data that are associated with a language for display:

1) Labels
2) Drop down choice lists
3) Geographical place names

The choice of the language for a report determines the display language of the first two. The geographical place name language is chosen separately. (For instance, one may want the geographical information in English despite the other choice). The system will handle any number of languages and any number of controls.

Input Report Forms

The report forms are actually XML templates that can be used by Infopath to generate a user interface. This structure provides several advantages:

1) Forms can be used independently from the database. Some scripting will be required to connect the forms to the database, unlike Access. Examples of the required scripts will be delivered as part of this system and will be already built-in to the provided forms.
2) Even though InfoPath is chosen as the forms editor, since they are written in the standard XML language other tools could also be used (with some extra effort).
3) The generated forms contain all the data validation and internal references that exist at the moment they are generated. To incorporate database changes, then, it is necessary to re-generate the forms. That means they stand alone and the user can work with the forms even when disconnected from the database (or the internet). But even when disconnected, error checking and help will be available.
4) The forms can be uploaded to the database, with minimal human assistance, in a variety of ways including the internet, email and file copy.
5) Forms contain internal codes that prevent duplicate or corrupted data uploads.
6) Because the forms are generated, multiple language versions of the user interface will be available and selectable at run-time.

The report input forms are a nested series of subforms that are selected according to the type of data being recorded. There is one main form and eight subforms (see original spreadsheet). There is also a main form for entering and editing data on locations with four subforms.

It will be possible to open the geographical input forms while entering locust reports in order to enter information on localities.

Form Name	Function
GEOFORM	Main form for geographical data: opens subforms
PROVINCEFORM	subform GEOFORM, edits PROVINCE data
DISTRICTFORM	subform GEOFORM, edits DISTRICT data
ZONEFORM	subform GEOFORM, edits ZONE data and ZONELINK table
LOCATIONFORM	subform GEOFORM, edits LOCATION table (alternative format for lat/long)
REPORTFORM	Main form for entering a report: opens subforms
LOCUSTFORM	subform of REPORTFORM: locust species and life-cycle stages
ECOLFORM	subform of REPORTFORM: terrain, soil and vegetation
CONTROLFORM	subform of REPORTFORM: pesticide quantity, sprayer type & number, area
MORPHFORM	subform of LOCUSTFORM: measurements of locust specimens
EGGFORM	subform of LOCUSTFORM: survey of eggfield location & size
QUADFORM	subform of EGGFORM: counts of eggpods in quadrats
PODSREC	subform of EGGFORM: examination of eggpods
WEATHERFORM	subform of REPORTFORM: weather observations

Outputs
The output reports are listed below. In the cases of CONTROL and CHEMICAL, the species included and the executing organization can be specified. In the case of LOCUST SURVEY, the user will select the species and life-history stages to be included in the output. A particular type of report, such as egg-laying by Moroccan locust, can be stored as a macro. In all reports, the dates to be included are selected by the user. For geographic data, export scripts will be written that produce output readable by standard visual mapping systems, including at least ArcView (from ESRI) and IDRISI and any other XML-compliant applications.

Form name	Type	Contents
CONTROL ADMIN	GIS	Area of control (ha) by geographical area (province, district or zone)
CONTROL ADMIN	Text	Area of control (ha) by area (prov, distr, zone or 1/10 degree sq)
CHEMICAL ADMIN	Text	Quantity of pesticide (litres/type) by administrative area (prov, dist)
LOCUST SURVEY	GIS	Locations of selected species at selected life-cycle stages in dec degrees
LOCUST SURVEY	Text	Area of selected species at selected life cycle stages summarised by geographical area (province, district, zone or 1/10 degree sq)
View Reports	Text	The user specifies dates, geographical area and data type to be viewed. This generates a query and the selected records, with their subforms, can be scrolled through and examined or printed.

*For example, the user may select Ecology in one zone between certain dates and the screen will show the basic record form with the Ecology subform.

Custom Query	Text	User-generated SQL query

Installation
Installation of the necessary software will be very easy and doable by non-technical personnel. A complete un-install capability will also be provided. The software will work on any normal configuration of hard disk drives and OS installation. The user will have a choice of location to install with the default in Documents And Settings.

At installation time, a choice of which languages to be included will be offered. The default is all currently available languages.

The addition of new languages after installation will be possible.

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11. Attach Performance Indicator Report

12. Attach Financials